Claims

What is claimed is:

1) A surgical tourniquet controller, said controller comprising:

a pressure source, said pressure source supplying a pressure medium at a sufficient pressure to pressurize a pressure cuff being used as a surgical tourniquet;

a pressure port, said pressure port allowing a pressure medium to be supplied to a pressure cuff;

a source valve, said source valve interposed between said pressure source and said pressure port;

an occlusion sensing means for detecting blood flow past a pressure cuff; and

a processor, said processor communicably connected to said occlusion sensing means, said processor further communicably connected to said source valve;

wherein said processor instructs said source valve to increase the pressure in a pressure cuff when said occlusion sensing means detects blood flow past the pressure cuff.

2) A surgical tourniquet controller according to claim 1, wherein said occlusion sensing means comprises a pressure transducer for detecting pressure variations in the pressure cuff indicative of blood flow past the pressure cuff.

3) A surgical tourniquet controller according to claim 2, wherein said occlusion sensing means further comprises a processor having instructions for detecting oscillometric pressure variations indicative of blood flow past the pressure cuff.

4) A surgical tourniquet controller according to claim 2, wherein said occlusion sensing means further comprises a processor having instructions for detecting Korotkoff sounds indicative of blood flow past the pressure cuff.

5) A surgical tourniquet controller according to claim 2, wherein said occlusion sensing means further comprises signal processing circuitry to detect oscillometric variations in the pressure indicative of blood flow past the pressure cuff.

6) A surgical tourniquet controller according to claim 2, wherein said occlusion sensing means further comprises signal processing circuitry to detect Korotkoff sounds indicative of blood flow past the pressure cuff.

7) A surgical tourniquet controller according to claim 1, further comprising a pressure threshold value, wherein said processor instructs said source valve to increase the pressure in a pressure cuff only when the increased pressure would not exceed the pressure threshold value.

8) A surgical tourniquet controller according to claim 1, further comprising a pressure relief valve, said pressure relief valve having a pre-determined pressure threshold value, said pressure relief valve being connected to said pressure port such that if a pressure in said pressure port exceeds said pressure threshold value, said pressure relief valve vents said pressure port.

9) A surgical tourniquet controller according to claim 1, wherein said occlusion sensing means comprises a photometric sensor for measuring blood oxygen saturation.

10) A surgical tourniquet controller according to claim 9, wherein said surgical tourniquet controller further comprises a pressure cuff, said photometric sensor being located on an inner surface of said pressure cuff.

11) A surgical tourniquet controller according to claim 10, wherein said photometric sensor comprises a laser doppler perfusion monitor.

12) A surgical tourniquet controller according to claim 9, wherein said surgical tourniquet controller further comprises a processor having instructions for detecting variations in sensed blood oxygen saturation levels indicative of blood flow past the pressure cuff.

13) A surgical tourniquet controller according to claim 9, wherein said surgical tourniquet controller further comprises signal processing circuitry for detecting variations in sensed blood oxygen saturation levels indicative of blood flow past the pressure cuff.

14) A method for controlling a surgical tourniquet, said method comprising the steps of:

inflating a pressure cuff to an initial pressure;

incrementally decreasing pressure in the pressure cuff until flow is detected by a flow sensor past the pressure cuff;

increasing the pressure in the pressure cuff a pre-set amount;

monitoring the flow sensor to detect flow past the pressure cuff; and

when flow is detected past said pressure cuff, incrementally increasing pressure in said pressure cuff until flow is no longer detected.

10) A method for controlling a surgical tourniquet according to claim 9, further comprising the step of:

when flow is detected past said pressure cuff, increasing the pressure in said pressure cuff a pre-set amount once flow is no longer detected past said pressure cuff.

11) A method for controlling a surgical tourniquet according to claim 9, further comprising the step of:

receiving a desired inflation duration;

starting a timer when the pressure cuff is initially inflated; and

deflating the pressure cuff when the desired inflation duration has occurred.

12) A method for controlling a surgical according to claim 9, further comprising the steps of:

receiving a desired inflation duration;

starting a timer when the pressure cuff is initially inflated;

informing an operator when the desired inflation duration has occurred.

13) A method for controlling a surgical according to claim 9, further comprising the steps of:

determining a threshold pressure above which the pressure cuff should not be inflated;

ceasing pressure increases when the threshold pressure is achieved; and

informing an operator that the threshold pressure has been achieved.

14) A method for controlling a surgical according to claim 9, further comprising the steps of:

receiving a threshold pressure above which the pressure cuff should not be inflated from an operator;

ceasing pressure increases if the threshold pressure is reached; and

informing an operator that the threshold pressure has been reached.

15) A computer readable medium tangibly embodying instructions which, when executed by a computer, cause a surgical tourniquet controller to:

inflate a pressure cuff to an initial pressure;

incrementally decrease pressure in the pressure cuff until flow is detected past the pressure cuff by a flow sensor;

increase the pressure in the pressure cuff a pre-set amount;

monitor the flow sensor to detect flow past the pressure cuff; and

when flow is detected past said pressure cuff, incrementally increase the pressure in said pressure cuff until flow is no longer detected.

receive indications from a sensor of blood flow past a pressure cuff when blood flows past the pressure cuff;

incrementally increase pressure in the pressure cuff when blood flow past a pressure cuff is detected;

determine whether the increased pressure in the pressure cuff has occluded blood flow past the pressure cuff; and

when blood flow has not been occluded, continue to incrementally increase blood pressure until blood flow past the pressure cuff is occluded.

16) A computer readable medium tangibly embodying instructions according to claim 15, wherein the instructions when executed further cause a surgical tourniquet controller to:

receive a desired inflation duration;

start a timer when a pressure cuff is initially inflated; and to

deflate the pressure cuff when the desired inflation duration has occurred.

17) A computer readable medium tangibly embodying instructions according to claim 15, wherein the instructions when executed further cause a surgical tourniquet controller to:

when blood flow past the pressure cuff is occluded, increase the pressure in said pressure cuff a pre-set amount.

18) A computer readable medium tangibly embodying instructions according to claim 15, wherein the instructions when executed further cause a surgical tourniquet controller to:

analyze pressure variations in the pressure cuff to detect oscillometric variations indicative of blood flow past said pressure cuff.

19) A computer readable medium tangibly embodying instructions according to claim 15, wherein the instructions when executed further cause a surgical tourniquet controller to:

analyze pressure variations in the pressure cuff to detect Korotkoff sounds indicative of blood flow past said pressure cuff.

19b) A computer readable medium tangibly embodying instructions according to claim 15, wherein the instructions when executed further cause a surgical tourniquet controller to:

analyze blood oxygen saturation levels indicative of blood flow past said pressure cuff.

20) A computer readable medium tangibly embodying instructions according to claim 15, wherein the instructions when executed further cause a surgical tourniquet controller to:

receive a desired inflation duration;

start a timer when a pressure cuff is initially inflated;

signal an operator when the desired inflation duration has occurred;

receive a deflate command from an operator; and

deflate the pressure cuff upon receipt of the command from an operator.

21) A pressure cuff for use as a surgical tourniquet, said pressure cuff comprising:

an inflatable bladder to compress an extremity and cause the occlusion of blood flow; and

a photometric sensor to measure blood oxygen saturation.

22) A pressure cuff according to claim 21, wherein said inflatable bladder is enclosed in a pressure cuff sheath, said pressure cuff sheath having an inner surface, and wherein said photometric sensor is mounted to said pressure cuff such that said photometric sensor forms a portion of the surface of the inner surface of the pressure cuff sheath.

23) A pressure cuff according to claim 21, wherein said inflatable bladder is enclosed in a pressure cuff sheath, and wherein said photometric sensor is engaged to said pressure cuff via a flap mounted to said sheath.

24) A pressure cuff according to claim 23, further comprising an unconstricted blood oxygen sensor.

25) A pressure cuff according to claim 24, wherein said unconstricted blood oxygen sensor is engaged to said pressure cuff via a flap mounted to said sheath.